DEPARTMENT OF ECONOMICS AND ECONOMETRICS

FINAL ASSESSMENT

NOVEMBER 2014

APK CAMPUS

Course: FINANCIAL ECONOMICS 4B

Course code: FNN8X02 / EKN4810 / EKN05X7

Marks: 100

Time: 3 Hours

Assessors: Prof L Bonga-Bonga

External Moderator: Mr M Makakabule

Internal Moderator: J Muteba Mwamba

Instructions:

1. Answer **all** questions.
2. Number of pages: 3 pages

Question 1 (12)

Assume an investor holds one unit of spot asset (S) and k units of futures (F) contracts in his/her portfolio, where k is the hedge ratio

1. Define the hedge ratio
2. Provide the expression for the standard deviation of this portfolio.
3. Find the expression of k that minimises the risk of this portfolio (show all the steps).
4. Show that k should be obtained from a linear regression of S on F .

Question 2 **(12)**

What is arbitrage?
Explain the arbitrage opportunity when the price of a dually listed mining company is R50 on the Johannesburg Stock Exchange and $5.2 (USD) in the New York Stock Exchange.
Assume the exchange rate is such that $1 equals R9.
Explain what is likely to happen to prices as traders take advantage of this opportunity.

Question 3 **(12)**

Call options on a stock are available with strike prices of R15, R17.50 and R20, and expiration date in 3 months. Their prices are R4, R2, and R0.50, respectively. Explain how the options can be used to create a butterfly spread. Construct a table showing how profit varies with stock price for the butterfly spread.

Question 4 **(12)**

Show that if the stock price process is given as $dS = \mu S dt$, the future stock price should be deterministic rather than stochastic. Provide a short discussion.

Question 5 **(16)**

5. 1 Discuss briefly the "operation twist" and explain why its method of working should indicate that expectations theory prevails in the US.

5.2 As regards the consequence of the operation twist on the yield curve, show that the future short-term interest rate is lower than the current short and long-term interest rates. Briefly discuss the implication of this relationship in the context of "quantitative easing".

5.3 Explain why the futures price converges to the spot price during the delivery period and discuss what would happen if this convergence fails.

Question 6 **(12)**

An investor enters on 1 January 2012 into two long July future on yellow maize to mature on 1 January 2013. The price per kilogram (kg) of the yellow maize is 150 cents on 1 January 2013. Each contract is for the delivery of 15 000 kg. The current futures price is 160 cents per kg. The initial margin is R6 000 per contract, and the maintenance margin is R4 500 per contract.

a. What price change should lead to a margin call? Explain
b. What price change should lead to R2 000 be withdrawn from the margin account? Explain
c. What is the risk-free rate implied by this future contract?

Question 7 **(12)**

7.1 A stock is expected to pay a dividend of R1 per share in two months and in five months. The stock price is R50, and the risk-free rate of interest is 8% per annum with continuous compounding for all maturities. An investor has just taken a short position in a six-month forward contract on the stock.

a. What is the forward price?
b. Three months later, the price of the stock is R48 and the risk-free rate of interest is still 8% per annum. What are the forward price and the value of the short position in the forward contract?

7.2 The two-month interest rates in Switzerland and the US are 3% and 8% per annum, respectively. Interest rates are compounded monthly. The spot price of the Swiss franc is $0.6500. The futures price for a contract deliverable in two months is $0.6600. What arbitrage opportunities does this create? Show all the explanation and calculation.

Question 8 **(12)**

Suppose that interest rates with continuous compounding are as follows:

Maturity (in months)	Rates (% per annum)
3	8
6	8.2
9	8.4
12	8.5
15	8.6
18	8.7

Calculate forward interest rates for the second, third, fourth, fifth and sixth quarters.

END OF PAPER